MYCOLOGIA

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DIAGNOSES OF AMERICAN PORIAS—I*

L. O. OVERHOLTS

(WITH PLATE 1 AND FIGURES 1–6 IN THE TEXT)

PORIA AMBIGUA Bres., Atti Accad. Rovereto III 3: 84. 1897

Original Description: Latissime effusa, margine superiore reflexo, alba, demum stramineo-isabellina, subiculo membranaceo, arcte adnata, albo, tubuli ut plurimum obliqui, hic inde nodulosocongesti, usque ad 8 mm. longi; pori majusculi, angulati, demum dentato-laceri; sporae hyalinae, obovatae, 5–8 x 3.5 μ; basidia clavata, 18–20 x 6–8 μ; cystidia fusoidea, apice muricelata et demum laeva, 24–30 x 6–8 μ; hyphae subhymeniales tenuiter tunicatae, septatae, 3–4 μ latae.

Ad truncos *Fagi, Carpini, . . . Piri communis . . . Robiniae pseudacaciae.*

Nutat inter *Poria* et *Irpices.*

Redescription: Annual, effused in orbicular or elongated patches 3–10 cm. long and 2–5 cm. broad, inseparable, where best developed with a regular, white, sterile, shortly pubescent margin 2–2.5 mm. broad; subiculum thin, white, inconspicuous; tubes unstratified, 0.5–6 (usually 2–4) mm. long, pure white to dirty white when fresh, often cinnamon-buff to cinnamon in dried plants, angular, very thin-walled, often with the shape of an inverted cone, the dissepiments finely ciliate-dentate, averaging 1–3 per mm.; spores ellipsoidal or oblong-ellipsoidal, smooth, hyaline, 4–6 x 2.5–3.5 μ; cystidia absent or very inconspicuous; tramal tissue compact, of long and flexuous, simple or somewhat branched hyphae, with occasional or rare cross walls, no clamps, diameter 3–4.5 μ; subiculum hyphae more branched, with more numerous cross walls, no clamps, diameter up to 6 μ.

* Contribution from the Department of Botany, The Pennsylvania State College, No. 35.

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On bark or wood of *Alnus, Amelanchier, Fagus, Gleditsia, Quercus,* and probably other deciduous trees; rarely on the ground or at the base of stumps, and then often encircling grass, weed stems, etc., in its growth.

Specimens Examined: Syracuse, N. Y.; Dayton and Oxford, Ohio (two collections); New Richmond and Ann Arbor, Mich.; St. Croix River, Minn.; St. Louis, Mo.; Fayetteville, Ark.

The writer's acquaintance with this species dates back to 1910, when it was collected at Oxford, Ohio, by Miss Audrey Richards and turned over to him for examination. Another collection was made in 1911, and in 1912 it was found growing on the ground

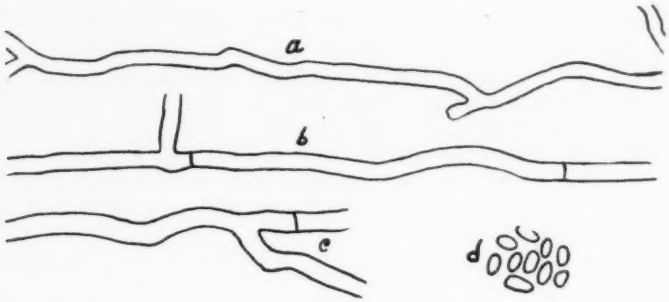


FIG. 1. *P. ambigua.* *a*, Hypha from the trama; *b*, Hypha from the subiculum; *c*, Larger type of hypha usually present; *d*, Spores.

in the garden of Professor Bruce Fink at Oxford. This latter collection was sent to Bresadola, who referred it to *P. ambigua,* described by him from Europe in 1897.

When fresh and growing, the color is white or dirty white, and the consistency of the fungus is soft but not watery. Older specimens, especially on drying, are apt to become darker, approaching cinnamon in color, but the affinities of the species are with the white Porias.

The tubes vary considerably in size, and there are always a considerable number that are inversely conical or funnel-shaped, perhaps due to the coalescence of two or more of them, as these are always larger than those that retain their cylindrical shape. The

peculiar shape of these tubes with their finely ciliate-dentate walls is a distinct aid in recognizing the plants in the field.

Internally the structure of the plant recalls that of *Polyporus pargamenus* Fr., although striking microscopic differences are not

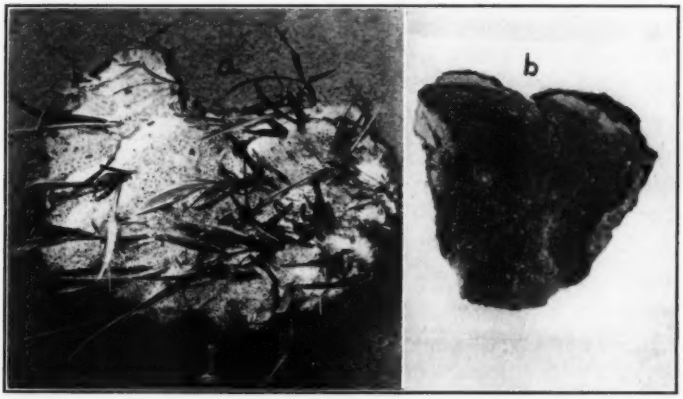


FIG. 2. *P. ambigua*. *a*, Specimen collected and photographed by Dr. A. H. W. Povah, Syracuse, N. Y., showing how the plant may grow around grasses, twigs, etc. (Overholts Herb. No. 5351.) *b*, Resupinate specimen on bark of *Fagus*. (Overholts Herb. No. 247.) × 1.

lacking. Plants in all stages of maturity show an abundance of oblong-ellipsoidal spores that measure 4–6 x 2.5–3.5 μ (Fig. 1, *d*). Their abundance suggests the possibility of their being conidial, but in sections of the hymenium it is not difficult to trace their connection to normal four-sterigmate basidia. Even a crushed preparation of the hymenium yields an abundance of spores. There are usually no cystidia to be seen, but prolonged search will sometimes yield inconspicuous conical or crystalline-capitate bodies, scarcely projecting beyond the basidia (Pl. I, fig. 6, *a*), and at first sight not readily distinguished from the latter. They are about 6 μ in diameter. The hyphae form a distinctive character of the species (Fig. 1, *a–c*). They are long and flexuous, with cross walls but no clamp connections, and are considerably branched. Those of the subiculum are more branched than those in the trama, have more frequent cross walls, and reach larger

diameters. In the trama it is not uncommon to find them without cross walls and only infrequently branched. The diameter of those of the trama varies from 3–4.5 μ, while in the subiculum they are mostly 4–6 μ.

Resupinate specimens of *Polyporus tulipiferus* and *P. pargamenus* have considerable resemblance to these plants. This is especially true of the former species in which the spores, especially before reaching mature size, are quite similar to those of this species. But in *P. tulipiferus* they are never obtainable in abundance in crushed mounts of the hymenium as they are in *P. ambigua*. Moreover, that species has conspicuous incrusted cystidia not difficult to find, and the diameter of the subiculum hyphae is not as great as in *P. ambigua*. Neither are the peculiar inversely conical tubes found in the former plant. From *P. pargamenus* the spores serve as the best distinguishing character, for in that species they are allantoid, 3–4 x 1 μ. The hyphae there are long and straight in both trama and subiculum, with few or no cross walls, unbranched, and the hymenium soon becomes decidedly irpiciform. These conditions are quite at variance with those found in *P. ambigua*.

The distinctive characteristics of the plant may be said to be the soft white growth, the inverted conical shape of some of the tubes, the abundant spores, lack of conspicuous cystidia, and the branched hyphae with cross walls but no clamps.

American collections of this species have been compared with authentic material kindly furnished by Rev. Bresadola, the author of the species, and they agree in all essential respects. The spore measurements given by the author are slightly larger than I find in both American and European material, but the difference is negligible. Rev. Bresadola also states that cystidia are present in the European plant, and on examining his material I find the same condition of affairs as described above for American material. In fact, the agreement of American and European material is in all particulars much closer than is ordinarily the case between species so widely separated.

PORIA FERRUGINOSA (Schrad.) Fr., Syst. Myc. 1: 378. 1821

Description, Fries, l. c.: Effusus, crassus, ferrugineo-spadiceus, poris subrotundis inaequalibus.

Inaequalis, saepe interruptus, durus, ½–1 unc. crassus, omnino excarnis. Pori mediae magnitudinis, subobliqui, acute.

Ad truncos Alneos. Aest.

Redescription: Effused for several centimeters on decorticated wood or rarely on bark; annual or at times perennial, 0.5–5 mm. thick, mostly inseparable, when young and growing with a brown tawny pubescent margin less than 1 mm. broad, when mature losing this and becoming entirely fertile; subiculum very thin, usually not more than 0.5 mm. thick, fibrous, scarcely discernible in thin fructifications; tubes frequently oblique, in one or rarely as many as four layers, 1–2 mm. long each season, not distinctly stratified in perennial specimens, brown within or the older layers somewhat whitish pubescent under a lens; the mouths cinnamon, sayal brown, or snuff brown, usually entirely without sheen though in some specimens a slight silkiness may be detected, unchanging on drying and the colors constant in herbarium specimens, subcircular to subangular, the dissepiments at most of only medium thickness and becoming thinner at maturity, even and entire except where growing in oblique situations, averaging 4–6 per mm.; spores oblong-ellipsoidal or oblong, hyaline, 4.5–5 x 2–3 μ; setae more or less abundant, rather short and sharp pointed, typically projecting 15–30 μ beyond the basidia, 5–7 μ diameter; hyphae straight and rigid, brown, no cross walls except rarely in the young hyphae, no clamps, simple, 2–3 μ diameter.

On dead wood of *Acer, Alnus, Fagus, Prunus, Populus, Salix, Ulmus, Quercus, Betula, Ostrya,* and perhaps other deciduous trees.

Specimens Examined: North Conway and Crawford Notch, N. H.; Cold Spring Harbor, Cranberry Lake, Vaughns, Karner, Crown Point, and Mechanicsville, N. Y.; Greenwood Furnace, Pa.; Oxford and Cincinnati, Ohio; Ann Arbor and New Richmond, Mich.; Edgemont, Ill.; Evaro, Mont.; Bellingham, Wash.; Ontario, Canada.

Apparently the species may be expected on all kinds of deciduous woods, but none have yet been seen on a coniferous substratum. It appears to be a species more abundant in the north and no specimens have been examined from south of Ohio. Ordinarily

the plant does not separate readily from the substratum and old specimens are entirely inseparable. But collections have been noted in which the young growing specimens on a smooth surface peel off in strips.

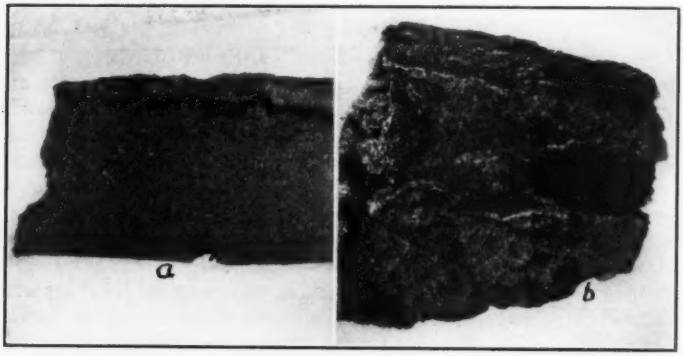


FIG. 3. *P. ferruginosa*. *a*, Specimen from Washington, on *Acer* (3879); *b*, Specimen from New Hampshire, on *Fagus* (5096). × 1.

When growing on an uneven surface or in a very oblique position the hymenium may be quite uneven and nodulose or thrown into distinct undulations. An extreme case of this unevenness is seen in specimens collected in Canada by Macoun and made the basis of a new species, *P. macouni*, by Peck. In these the plants were growing over old mosses. Otherwise they are typical *P. ferruginosa*.

Usually the species is annual or at least most of the collections examined are of the annual type. The greatest departure from this condition that has come under observation is in specimens on *Acer* from Washington, collected by Weir. In these, four layers of tubes are present. When cut with a sharp knife and examined under a lens these layers of tubes are fairly distinct, but to the naked eye they are not sharply separated. The hymenial surface of old weathered specimens occasionally fades out to gray.

The affinities of the species are with *P. viticola* Schw., for which a better name is probably *P.* (*Trametes*) *tenuis* Karst. From this species it is distinct in the spores, which there are cylindric

and measure 6–7 x 2 μ, consequently longer and more slender in proportion than in *P. ferruginosa*. In most cases there is an additional difference in the setae, which here project only 15–20 μ (Pl. I, figs. 3–4), or at most not more than 27 μ, beyond the basidia, while in *P. viticola* they are usually much longer, sometimes projecting as much as 60 μ beyond the basidia. However, a few collections of *P. viticola* have been noted in which this distinction does not hold, but in which the setae are quite like those of *P. ferruginosa*. In such cases the importance of the spores as a distinguishing character is much enhanced. Of course, some collections

FIG. 4. *a*, Hyphae of *P. ferruginosa*; *b*, Spores.

do not contain spores, and other characters must be used in distinguishing between this species and its allies. However, the difference between the setae in ordinary cases is striking, especially if they be compared side by side under the microscope. Occasionally the hymenium of *P. viticola* is somewhat daedaloid—a condition never seen in *P. ferruginosa*.

Poria marginella Peck is a similar species on coniferous wood, but its spore characters are those of *P. viticola*.

The decay caused by this fungus is of the general deligNifying type, producing a uniform whitening and softening of the sapwood. No striking characteristics are shown by it. The fungus is apparently not an organism inducing rapid decay, and as it is almost entirely confined to the smaller branches is not of great economic importance in producing timber loss.

PORIA NIGRESCENS Bres., Atti Accad. Rovereto III 3: 83. 1897

Original Description: Late effusa—subiculo membranaceo, stramineo, facile separabili, 1–1.5 mm. crasso; tubulis concoloribus, usque ad 2 mm. longis; poris parvis, subrotundis, in vegeto albis, dein pallide carneo-violaceis, demum nigrescentibus; hyphis subhymenialibus tenuiter tunicatis, 4–6 μ latis; sporis non visis.

Perennans, stratosus, tubulis singolorum annorum strato intermedio floccoso distinctis.

Ad truncos emortuos *Abietis pectinatae*. Hung.

Redescription: Perennial, or at least often persisting for as much as three or four years, effused in orbicular or elongated patches 3–9 cm. long, 2–5 cm. broad, and up to 1.5 cm. thick, separable at least in age, with a narrow adnate or loosening border on which partially formed pores are visible under a lens; subiculum distinct but scarcely 0.5 mm. thick, white when fresh, more yellowish on drying; tubes in old plants in distinct layers separated by thin layers of context and in drying sometimes partially loosening from each other, typically with the growth of each season not covering all the hymenial area produced in the preceding season, 1.5–5 mm. long each season, close to light vinaceous fawn (flesh color) when fresh, some specimens drying out to cinnamon drab or avellaneous, others to fuscous or dusky drab, subcircular to angular, rather thick-walled, averaging 5–6 per mm., the dissepiments entire; spores broadly ellipsoidal to nearly globose, smooth, hyaline, 3–5 μ diameter; cystidia none; hyphae hyaline, mostly very thick-walled, simple, with cross walls but no clamps, diameter 4.5–7.5 μ.

On rotten logs of deciduous wood, especially beech and birch.

Specimens Examined: North Conway, N. H.; Ithaca, Jamesville, and Catskill Mts., N. Y.; Oxford and West Elkton, Ohio; Frankfort, Mich.

The characteristic features of the species appear to be the flesh-colored tint of the hymenium of fresh plants, this fading and darkening on drying; the peculiar perennial habit with the receding growth and well-marked layers of successive years; and the very compact trama with thick-walled hyphae as much as 7.5 μ diameter (Fig. 6, *a*).

No specimens are at hand in which more than four layers of tubes are present, and the plant is evidently not indefinitely perennial. Each layer of tubes is laid down on a thin, distinct layer of context, and in dried specimens these layers have separated to such an extent that they may be readily removed, one from the other. Moreover, the peculiar habit of the receding marginal growth suggests that at the beginning of successive years the hyphae that have persisted are in localized areas from which the current season's growth proceeds, forming at first, on the surface of the old hymenium, small orbicular patches which gradually enlarge but never or rarely cover the entire area of the old hymenium.

In cross sections of the hymenium the trama is seen to be very compact, the sections of the closely crowded, thick-walled hyphae giving a pseudo-cellular appearance (Pl. I, fig. 2), such as is always found in similar sections of the hymenium of *Fomes connatus*, a common perennial sessile form on species of *Acer*. Moreover, Bresadola, the author of this species, states that it has often been confused with the resupinate form of *F. connatus* (=*F.*

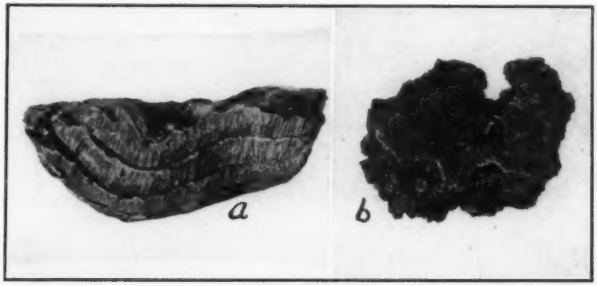


FIG. 5. *P. nigrescens*. *a*, Lateral view of vertical section through sporophore, showing the evident, separating annual layers; *b*, Surface view showing the failure of growth of current season to cover the entire growth of the previous year. × 1.

populinus). This pseudo-parenchymatous appearance is also present in the hymenium of *Polyporus rigidus* Lév. as interpreted by the writer, which species is also often entirely resupinate, has a flesh-colored hymenium when fresh, the spores being similar. However, that species does not become noticeably darker on drying, nor is it ever perennial. In the present species the hymenium in some collections is now quite blackish or smoke-colored.

The identity of American collections rests in part on the opinion of Rev. Bresadola, its author, who so referred specimens of one of the collections cited above. In addition he has very kindly communicated to the writer a small portion of co-type material which has been carefully examined and with which the writer's specimens agree quite fully. The original description says "sporis non visis," and, curiously enough, they are rarely found in dried American specimens, but have been found abundantly in fresh material. In the co-type material they are absent from the appar-

ently well-developed and matured part of the hymenium, as are also the basidia, but on examining the forming tubes on the marginal growth a number of spore-like bodies, the counterparts of the spores found in fresh American collections, were encountered. They were not attached to basidia, but in all probability represent

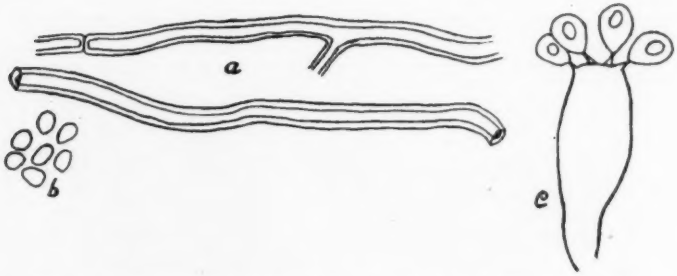


FIG. 6. *a*, Thick-walled hyphae characteristic of *P. nigrescens; b*, Spores; *c*, Basidium with 4 spores.

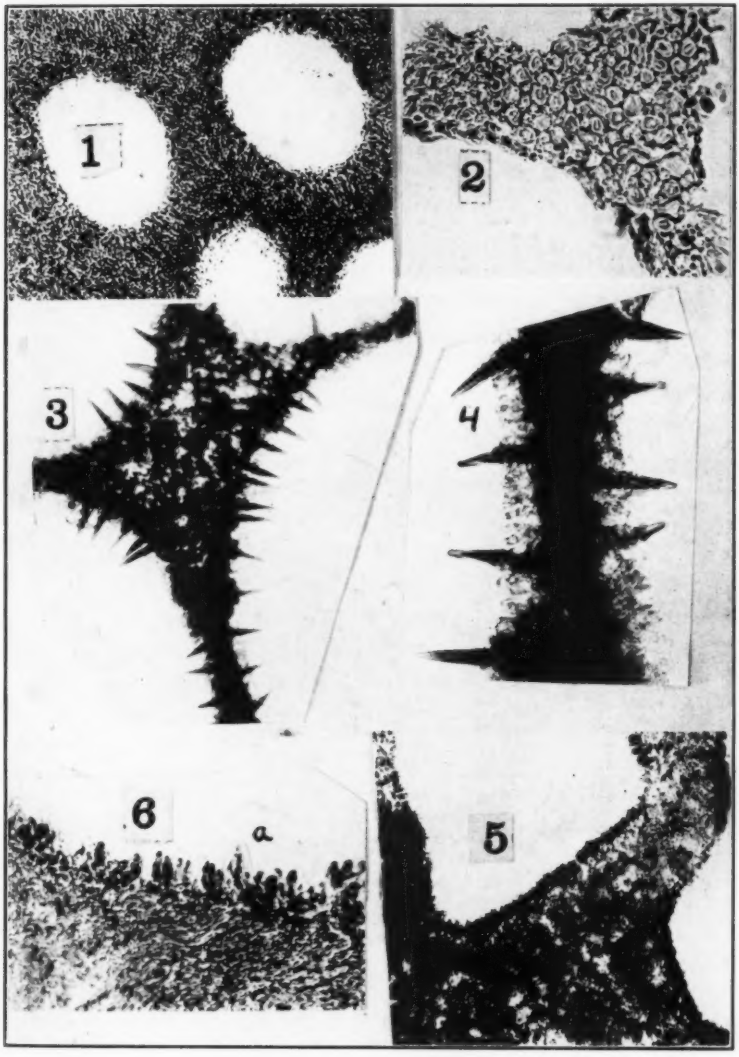
the spores of the specimen. In practically all cases basidia and spores are uniformly absent from the tubes of well-developed specimens (Pl. I, figs. 1–2).

Bresadola's specimens were said to have grown on the wood of *Abies pectinata*, a coniferous substratum, while all American collections so far examined have been from the wood of deciduous trees.

Dr. Murrill[1] considers this plant not specifically distinct from *P. undata* (Pers.) Bres., and gives, among others, *P. odora* Peck and *Polyporus broomei* Rab. as synonyms. *P. odora* was recently described[2] by myself as having allantoid spores which would remove the possibility of its being connected with the present species. Since the publication of Dr. Murrill's opinion I have reexamined specimens from Peck's types and have thoroughly convinced myself that my former statement was correct. I have found abundant allantoid spores attached to 4-sterigmate basidia. As previously stated, the older parts of the hymenium in this collection are not in sporulating condition, but toward the margin of

[1] Mycologia **13**: 87. 1921.

[2] Bul. N. Y. State Mus. 205–206: 97–99. 1919.



1, 2. PORIA NIGRESCENS
3, 4. PORIA FERRUGINOSA
5, 6. PORIA AMBIGUA

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the fructification I find the spores as described. My sectional preparations have been exhibited to other members of the Botany Department at this institution and all have agreed that no other interpretation is possible. On the other hand, I have repeatedly demonstrated the connection of the globose spores of *P. nigrescens* with their basidia (Fig. 6, *c*). Consequently these plants can not represent the same species, although so similar that at present the writer is not aware of any separating characters other than the spores and the basidia. The basidia of *P. nigrescens* are large, 5–7 μ in diameter, while those of *P. odora* are much smaller, only 2–4 μ.

I have not recently examined *P. broomei* as distributed by Rabenhorst (Fung. Eur. 2004), and specimens are not at present available. My judgment would be, however, that it represents what I have previously referred to *Polyporus rigidus* Lév. This plant is only rarely pileate, and when resupinate I find it very difficult to distinguish, microscopically and macroscopically, from thin light-colored forms of *P. nigrescens*.

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EXPLANATION OF PLATE I

Fig. 1. *P. nigrescens*. Microphotograph of cross-section of hymenium, × 160.

Fig. 2. Same, × 320, showing the absence of basidia in well-developed specimens; also the peculiar thick-walled hyphae that give a pseudo-cellular appearance to the trama.

Fig. 3. *P. ferruginosa*. Microphotograph of cross-section of the hymenium, × 160, showing the abundant setae.

Fig. 4. Same, × 320, showing the setae.

Fig. 5. *P. ambigua*. Microphotograph of cross-section of the hymenium, × 160.

Fig. 6. Same, showing the occasional cystidia as at *a*.

UREDINALES COLLECTED BY FRED J. SEAVER IN TRINIDAD*

J. C. Arthur

No attempt has heretofore been made to enumerate the rusts of Trinidad. The present list of 71 species makes a creditable beginning. Probably two or three times this number may be found when a more thorough exploration is made. Over 160 species are already known for the island of Porto Rico, and about the same number for Cuba. Porto Rico has not one tenth the area of Cuba, and Trinidad has not quite one half the area of Porto Rico, but has a diversified topography and nearness to the mainland that will doubtless largely compensate for lessened area.

The island of Trinidad lies so close to the coast of South America that it is more properly considered a part of the southern continent rather than of the northern. Its flora is excluded from the volumes of the North American Flora.

The collections made by Dr. Seaver were obtained during the six weeks between March 1 and April 14, 1921. The visit to the island was made in the company of Dr. N. L. Britton,[1] who supplied a preliminary determination of the hosts in the field. The hosts have since been checked over by Mr. Percy Wilson at the herbarium of the New York Botanical Garden.

It is worthy of note that although Dr. Seaver gave his chief attention to other groups of fungi, yet he was able to secure 169 collections of Uredinales, which have yielded 71 species of rusts, 3 being new, or 4 including the one supplied by Mr. Nowell, as well as quite a number that are little known.

In the following list space has been economized by omitting the exact localities, except for new species, and by referring to the page of the seventh volume of the North American Flora, where

* Contribution from the Botanical Department of Purdue University Agricultural Experiment Station.

[1] For a detailed account of this trip, see Journal of the New York Botanical Garden for May, 1921.

the synonymy can be found, so far as that work has been published. All collections, except the one noted, are to be credited to Dr. Seaver, and the date of collection is March–April, 1921. Numbers 26, 33, 39, 41, 46, 47, 50, 52–57, thirteen in all, or eighteen per cent, are short-cycle species, the remaining fifty-eight are various forms of long-cycle species.

1. COLEOSPORIUM IPOMOEAE (Schw.) Burr. N. A. F. 87

On *Ipomoea glabra* (Aubl.) Choisy, II, *3181, 3275, 3291; Ipomoea* sp., II, *3274, 3385*. A common rust in its uredinial stage throughout tropical America.

2. PHAKOPSORA CROTONIS (Cooke) Arth. N. A. F. 104

On *Croton gossypifolium* L., II, *3253, 3424; C. hirtus* L'Her., II, *3109*. This rust was described by P. Hennings (Hedwigia **35**: 251. 1896) under the name *Uredo crotonicola,* on *Croton granulosus* from Argentina.

3. PHAKOPSORA MEIBOMIAE Arth. Bull. Torrey Club **44**: 509. 1917

On *Meibomia supina* (Sw.) Britton, II, *3197; M. triflora* (L.) Kuntze, II, *2960*.

4. CEROTELIUM GOSSYPII (Lagerh.) Arth. N. A. F. 187

On *Gossypium* sp., II, *2953, 3388*.

5. RAVENELIA INDIGOFERAE Tranz. N. A. F. 144

On *Indigofera suffruticosa* Mill. (*I. Anil* L.), *3077*.

6. PROSPODIUM APPENDICULATUM (Wint.) Arth. N. A. F. 160

On *Tecoma Stans* (L.) Juss., III, *3406, 3430*.

7. **Prospodium suppressum** sp. nov.

O. Pycnia amphigenous, numerous, blackish-brown, inconspicuous, subcuticular, conic, small, about 100 μ broad and about same height; ostiolar filaments wanting.

II. Uredinia at first (primary) amphigenous, interspersed with the pycnia in circular groups 2–4 mm. across on somewhat larger discolored spots, afterward (secondary) hypophyllous, scattered, minute, 0.1–0.2 mm. in diameter, soon naked, pulverulent, chestnut-brown; paraphyses few or wanting; urediniospores flattened laterally, seen from flattened side globoid or somewhat obovoid, 23–32 by 25–40 μ, seen from narrow side obovate, and apparently acute above; wall with a hygroscopic layer, the inner layer firm, cinnamon-brown, 3 μ thick, the cuticle and subcuticular layers colorless, verrucose-echinulate with close-set, blunt projections on the flattened sides, becoming much longer on the narrowed sides and, as the spores are ordinarily seen, appearing like a coarse fringe, 5–7 μ wide, extending around the spore, the pores 2, distinct, one in center of each flattened side.

III. Telia hypophyllous, in loose groups, at first bullate, soon naked, somewhat pulverulent, chocolate-brown, ruptured cuticle noticeable; teliospores ellipsoid, 21–24 by 25–34 μ, rounded above and below, slightly constricted at septum; wall dark chestnut-brown, uniformly 2–3 μ thick, sparingly and evenly verrucose; pedicel colorless, as long as spore, slender, tapering downward, the appendages obsolete.

On *Tabebuia* sp. (Bignoniaceae), Las Lilas, March 24–28, O, II, *3350* (type); Pointe Gourde, March 31, II, III, *3408;* Forest, Siparia Quarry, April 8, III, *3526;* Lady Chancellor Road, March 14, II, iii, *3180.* The group of species to which this new species belongs is imperfectly understood. There are probably quite a number of them, but at present the collections are frequently unnamed or listed under the genus *Uredo* or *Puccinia,* and have not been brought together for comparative study.

8. UROMYCES AFFINIS Wint. Hedwigia **24**: 259. 1885

On *Hypoxis decumbens* L., II, *3192, 3199, 3387.* The aecia and telia of this species were found in Missouri in 1883 by Demetrio, the earliest collection of the rust known, but so few urediniospores were present that they were not mentioned in the original description. Since that time many collections showing abundance of uredinia have been taken in the eastern United States, and recently the tropical collections, which show only uredinia and are usually reported under the names *Uredo Hypoxidis* (Bres.) P. Henn. and *Uredo globulosa* Arth., have been referred to the same species.

9. UROMYCES APPENDICULATUS (Pers.) Fries, N. A. F. 257

On *Phaseolus* sp., *3249*.

10. UROMYCES BIDENTICOLA (P. Henn.) Arth. Mycologia **9**: 71. 1917

On *Bidens pilosa* L., II, *3075*, *3190*.

11. UROMYCES COLUMBIANUS Mayor, Mém. Soc. Neuch. **5**: 467. 1913

On *Melanthera aspera* (Jacq.) Steud., I, II, *3245*; II, *3239*, *3301*.

12. UROMYCES DOLICHOLI Arth. N. A. F. 258

On *Cajan Cajan* (L.) Millsp., *3028*, *3335*, *3487*.

13. UROMYCES HEDYSARI-PANICULATI (Schw.) Farl. N. A. F. 248

On *Meibomia Scorpiurus* (Sw.) Kuntze, *3194*; *M. affinis* (Sch.) Kuntze, *3306*.

14. UROMYCES HOWEI Peck, N. A. F. 264

On *Asclepias Curassavica* L., II, *3304*.

15. UROMYCES JANIPHAE (Wint.) Arth. Mycologia **7**: 190. 1915

On *Manihot Manihot* (L.) Cockerell, II, *3268*, *3279*, *3423*. Uredinia of this rust are common in tropical America, but the aecia and telia have only been found in Mexico.

16. UROMYCES LEPTODERMUS Sydow, N. A. F. 224

On *Lasaicis* sp., II, *3402*, *3477*.

17. UROMYCES MAJOR Arth. (*Uredo ignobilis* Arth.), N. A. F. 225

On *Sporobolus indicus* (L.) R. Br., II, *3093*.

18. UROMYCES NEUROCARPI Diet. N. A. F. 258

On *Clitoria rubiginosa* Juss., II, III, *3206*, *3292*.

19. UROMYCES PROËMINENS (DC.) Pass., N. A. F. 259

On *Chamaesyce hirta* (L.) Millsp., *2965*, *2973*, *3302*, *3436*, *3528*.

20. UROMYCES SCLERIAE P. Henn. N. A. F. 233

On *Scleria melaleuca* Schlecht. & Cham., II, *3299*. It has been reported from Cuba, Porto Rico, and southern Brazil.

21. UROMYCES WULFFIAE-STENOGLOSSAE Diet. Ann. Myc. **6**: 96. 1908

On *Wulffia baccata* (L. f.) Kuntze, I, *2971;* II, iii, *3244;* I, II, iii, *3231*.

22. PUCCINIA ACNISTI Arth. N. A. F. 471

On *Acnistus arborescens* Schlecht., I, *3178, 3227, 3524*.

23. PUCCINIA AEQUINOCTIALIS Holway, Ann. Myc. **3**: 22. 1905

On *Cydista aequinoctialis* (L.) Miers, II, *3092*.

24. PUCCINIA ANGUSTATOIDES R. E. Stone, N. A. F. 351

On *Rynchospora cyperoides* (Sw.) Mart., III, *2976*.

25. PUCCINIA ANTIOQUIENSIS Mayor, N. A. F. 347

On *Cyperus diffusus* Vahl, II, iii, *3337, 3393;* III, *3269*. The three collections show many 1-celled teliospores (mesospores), and the few teliospores found on *3337* and *3393* were all 1-celled, which would entitle these two collections to be entered under the genus *Uromyces*. The number of teliospores present are too few, however, to warrant the introduction of a new name.

26. PUCCINIA ARECHAVALETAE Speg. An. Soc. Ci. Arg. **12**: 67. 1881

On *Urvillea Seriana* (L.) H. B. K., *2966, 3133, 3139, 3345, 3479*.

27. PUCCINIA BIGNONIACEARUM Speg. An. Soc. Ci. Arg. **26**: 11. 1888

On *Bignoniaceae*, III, *3333, 3378*.

28. PUCCINIA CANNAE (Wint.) P. Henn. N. A. F. 380

On *Canna* sp., II, *3105, 3201, 3483; Maranta arundinacea* L., II, *2969, 3091, 3138, 3141, 3476*. The latter host has not before been reported.

29. PUCCINIA DEFORMATA Berk. & Curt. N. A. F. 294

On *Olyra latifolia* L., ii, III, *3474*.

30. PUCCINIA EUPATORII-COLUMBIANI Mayor, Mém. Soc. Neuch. **5**: 514. 1913

On *Eupatorium inulaefolium* H. B. K., II, III, *3587*.

31. PUCCINIA GOUANIAE Holway, Ann. Myc. **3**: 21. 1905

On *Gouania polygama* (Jacq.) Urban, II, *3027, 3457, 3090, 3254;* II, III, *3478, 3117*.

32. PUCCINIA HELICONIAE (Diet.) Arth. Bull. Torrey Club **45**: 144. 1918

On *Heliconia psittacorum* (L. f.) Kuntze, II, *3202; Heliconia* sp., II, *3525*.

33. PUCCINIA HETEROSPORA Berk. & Curt. Jour. Linn. Soc. **10**: 356. 1868

On *Abutilon giganteum* (Jacq.) Presl, *3458*.

34. PUCCINIA HYDROCOTYLES (Link) Cooke, Grevillea **9**: 14. 1880

On *Hydrocotyle Hazeni* Rose, II, *3426*.

35. PUCCINIA HYPTIDIS (M. A. Curt.) Tr. & Earle, N. A. F. 408

On *Hyptis capitata* (L.) Jacq., II, *2968*.

36. PUCCINIA HYPTIDIS-MUTABILIS Mayor, N. A. F. 410

On *Hyptis mutabilis* (A. Rich.) Briq., I, *3074, 3386;* II, *3107, 3189*.

37. **Puccinia** (?) **ignava** comb. nov. (*Uredo ignava* Arth.), N. A. F. 341

On *Bambos* sp., II, *2958, 3111*. Although the teliospores of this species are not known, it is highly probable that they will eventually be found to conform to the requirements of the genus *Puccinia*, and for convenience it is now so listed.

38. PUCCINIA IMPEDITA Mains & Holway; Arth. Mycologia **10**: 135. 1918

On *Salvia occidentalis* Sw., II, *2962, 3272.*

39. PUCCINIA LANTANAE Farl. Proc. Am. Acad. Sci. **18**: 83. 1883

On *Priva lappulacea* (L.) Pers., *2955, 2970, 3397.*

40. PUCCINIA LEONOTIDIS (P. Henn.) Arth. N. A. F. 407

On *Leonotis nepetaefolia* (L.) R. Br., II, *3273, 3354.*

41. PUCCINIA OBLIQUA Berk. & Curt.; Berk. Jour. Linn. Soc. **10**: 356. 1869

On *Metastelma* sp., *3188, 3448, 3488.*

42. PUCCINIA PALLESCENS Arth. (*Uredo pallida* D. & H.), N. A. F. 278

On *Zea Mays* L., II, *3103, 3110.* No teliospores of this rust have yet been found on corn (maize), and the aecia are unknown.

43. PUCCINIA RUELLIAE (Berk. & Br.) Lagerh. N. A. F. 415

On *Blechum Blechum* (L.) Millsp. (*B. Brownei* Juss.), II, *2957, 3096, 3195; Diantha pectoralis* (Jacq.) Gmel. (*Justicia pectoralis* Jacq.), II, *2954, 3191.* The second host is a new record for the species.

44. PUCCINIA SCLERIAE (Paz.) Arth. (*Aecidium passifloricola* P. Henn.) N. A. F. 349

On *Passiflora rubra* L., I, *3422.*

45. **Puccinia Seaveriana** sp. nov.

II. Uredinia amphigenous, sparsely grouped or singly on yellowish spots, irregularly rounded, 0.1–0.5 mm. across, at first bullate, soon naked, somewhat pulverulent, cinnamon- or chestnut-brown, ruptured epidermis conspicuous; paraphyses peripheral, abundant, strongly incurved, cylindric, sometimes inclined toward capitate, 10–15 by 40–50 μ, the wall thin, 1 μ, and pale or colorless below, much thickened above, 3–6 μ, and dark chestnut-brown; urediniospores broadly ellipsoid or globoid, 16–22 by 18–27 μ; wall cinnamon-brown, thin, 1–1.5 μ, closely and conspicuously echinulate, the pores 3, equatorial.

III. Telia not seen; teliospores in the uredinia oblong, 25–30 by 40–45 μ, rounded above and below, slightly or not constricted at septum; wall dark chestnut-brown, uniformly thick, about 3 μ, closely and noticeably verrucose; pedicel colorless, slender, fragile, once length of spore or shorter.

On *Oliganthes condensatus* (Less.) Schr. Bip. (*Carduaceae*), Lady Chancellor Road, March 14, II, *3179;* same, March 17, II, *3236;* same, March 21, II, *3283* (type); *Oliganthes Milleri*(?), western end of Monos Island, April 4, II, iii, *3459*. The hosts belong to the tribe Vernonieae, and are part of a genus comprising about eight species confined to tropical America. All the species are trees or shrubs, *Oliganthes condensatus* producing the largest individuals known among the composites. The rust is notable for its abundance of deeply colored paraphyses. Such structures have been recorded for only one other species on the tribe Vernonieae. Only a few teliospores were found. The type for the species has been chosen to show the most characteristic and best development of the uredinia, although the presence of teliospores could not be demonstrated. The few teliospores seen were on a collection which also had but few uredinia. The specific name is selected to give recognition to the devotion of the collector of this and other material which is the basis of this report, by which he has added greatly to the store of mycological knowledge.

46. **Puccinia solanita** (Schw.) comb. nov. (*Aecidium solanitum* Schw. Jour. Acad. Sci. Phila. II, **2**: 283. 1853; *Puccinia claviformis* Lagerh. Tromsö Mus. Aarsh. **17**: 53. 1895)

On *Solanum* sp., *3295*. The type collection for *Aecidium solanitum* is amply represented in the Schweinitz herbarium at the Philadelphia Academy of Science. An examination of this material shows that it bears a short-cycle rust, identical in appearance with *Puccinia claviformis*. The collection has also been examined by Mr. Percy Wilson and Dr. J. K. Small of the New York Botanical Garden, and they pronounce the host to be a species of *Solanum*, possibly *S. Melongena* L.

47. PUCCINIA SPEGAZZINII DeToni in Sacc. Syll. **7**: 704. 1888

On *Mikania micrantha* H. B. K., *3527; Mikania* sp., *2956, 3135, 3228, 3312*.

48. PUCCINIA STRIOLATA (Speg.) Arth. (*P. macropoda* Speg.) N. A. F. 387

On *Iresine Celosia* L., I, II, *3137*.

49. PUCCINIA SUBSTRIATA Ell. & Barth. N. A. F. 289

On *Eriochloa punctata* Ham., II, *3193*.

50. PUCCINIA SYNEDRELLAE P. Henn. Hedwigia **37**: 277. 1898

On *Synedrella nodiflora* (L.) Gaertn., *2964, 3271, 3586; Emilia sonchifolia* (L.) DC., *3073*.

51. PUCCINIA TUBULOSA (Pat. & Gaill.) Arth. (*Uredo paspalicola* P. Henn.) N. A. F. 288

On *Paspalum paniculatum* L., ii, *3112; Paspalum* sp., II, *2961, 3185; Syntherisma digitata* Hitchc., II, *3339*. The aecia of this species occur on *Solanum torvum* and closely related hosts.

52. PUCCINIA URBANIANA P. Henn. Hedwigia **37**: 278. 1898

On *Valerianodes cayennensis* (Vahl) Kuntze, *2967, 2972, 3255*.

53. ENDOPHYLLUM CIRCUMSCRIPTUM (Schw.) Whetzel & Olive, Am. Jour. Bot. **4**: 49. 1917

On *Cissus sicyoides* L., *3267*.

54. ENDOPHYLLUM DECOLORATUM (Schw.) Whetzel & Olive, l. c.

On *Clibadium surinamense* L., *3177, 3270*.

55. ENDOPHYLLUM WEDELIAE (Earle) Whetzel & Olive, l. c.

On *Wedelia trilobata* (L.) Hitchc., *3087*.

56. ENDOPHYLLOIDES PORTORICENSIS Whetzel & Olive, l. c.

On *Mikania* sp., *3136, 3523*.

57. PUCCINIOSIRA PALLIDULA (Speg.) Lagerh. N. A. F. 127

On *Triumfetta* sp., *3079, 3248b, 3252, 3310*.

58. UREDO ADENOCALYMMATIS P. Henn. Hedwigia **35**: 249. 1896

On Bignoniaceae, *3203, 3340*. This rust, both in its spores and paraphyses, has a close resemblance to species which have been

referred to the genus *Prospodium*. The paraphyses are notable for their scimitar shape, sharp points, and cross walls. It has been reported on *Pyrostegia venusta*, as well as on the type genus.

59. UREDO COMMELYNAE Kalchbr. Grevillea **11**: 24. 1882

On *Commelina elegans* H. B. K., *3390*.

60. UREDO CYATHULAE Mayor, Mém. Soc. Neuch. **5**: 584. 1913

On *Cyathula achyranthoides* (H. B. K.) Moq., *3334*.

61. UREDO MACULANS Pat. & Gaill. Bull. Soc. Myc. Fr. **4**: 98. 1888

On *Pfaffia iresinoides* (H. B. K.) Kuntze, *3076*, *3250*, *3303*.

62. UREDO MANDEVILLAE Mayor, Mém. Soc. Neuch. **5**: 591. 1913

On *Mandevilla tomentosa* (Vahl) Kuntze, *3258*, *3285*, *3297*.

63. UREDO RUBESCENS Arth. Mycologia **7**: 327. 1915

On *Dorstenia Contrajerva* L., *3078*, *3475*.

64. UREDO TRICHILIAE Arth. Mycologia **9**: 90. 1917

On *Trichilia trinitensis* A. Juss., *3305*, *3421*.

65. UREDO VICINA Arth. Mycologia **7**: 325. 1915

On *Wedelia Jacquini* Rich., *3432*.

66. UREDO VITICIS Juel, Bih. K. Sv. Vet.-Akad. Handl. **23**(3)[10]: 26. 1897

On *Vitex* sp., *3293*.

67. **Aecidium Alibertiae** sp. nov.

O. Pycnia epiphyllous, numerous in circular groups on discolored spots 4–10 mm. across, prominent, subepidermal but appearing subcuticular, flattened-conic, large, 160–210 μ in diameter, 65–80 μ high; hymenium flat; ostiolar filaments wanting.

I. Aecia hypophyllous, opposite the pycnia, short-cylindric, 0.3–0.4 mm. in diameter, deep-seated, extending half way through the leaf; peridium colorless, the margin coarsely lacerate, fragile; peridial cells in front view angularly ellipsoid or oblong, in side view lanceolate, strongly overlapping, 16–20 by 30–40 μ, the outer wall thin, 1–2 μ, smooth, the inner wall thicker, 2–5 μ, moderately

and closely verrucose; aeciospores globoid, 21–26 by 23–29 μ; wall pale or cinnamon-brown, 1.5–2 μ thick, finely and closely verrucose.

On *Alibertia* sp. (Rubiaceae), Piarco savanna, March 15, *3204;* Piarco savanna, south of Dabadie, March 21, *3286* (type); Meara savanna, March 22, *3296*. The species is remarkable for the large pycnia, that are formed beneath the thin epidermis, but above the thick palisade cells. They are morphologically similar to subcuticular pycnia.

68. AECIDIUM BRASILIENSE Diet. Hedwigia **36**: 35. 1897

On *Cordia cylindrostachya* R. & S., *3106, 3246, 3251, 3277*.

69. AECIDIUM BYRSONIMATIS P. Henn. Hedwigia **34**: 101. 1895

On *Byrsonima verbascifolia* Rich. (?), *3200*.

70. **Aecidium delicatum** sp. nov.

O. Pycnia amphigenous, in small close groups, punctiform, honey-yellow, noticeable, subepidermal, globoid, about 125 μ in diameter.

I. Aecia hypophyllous, surrounding the pycnia, somewhat circinating, on yellowish spots 1–2 mm. across, low and broad, 0.5–0.8 mm. in diameter; peridium delicate, erect, finely erose; peridial cells oblong in surface view, rhomboidal in side view, slightly overlapping, 26–32 μ long, the wall colorless, the inner wall 3–5 μ thick, finely verrucose, the outer wall thinner, smooth; aeciospores globoid or ellipsoid, 16–24 by 20–30 μ; wall colorless, thin, 1 μ, minutely and closely verrucose.

On *Eucharis* sp. (Amaryllidaceae), Port of Spain, no date, collected by Nowell and communicated by Seaver. Little comparative study has been made of the rusts on Amaryllidaceous hosts. Their identity is made especially difficult by the collection of single stages and on hosts not fully determined.

71. AECIDIUM TOURNEFORTIAE P. Henn. Hedwigia **34**: 338. 1895

On *Tournefortia tomentosa* Mill., *3278*.

INDEX TO UREDINALES

(New or newly combined names are in **bold face** type)

HOST INDEX

PURDUE UNIVERSITY,
LAFAYETTE, INDIANA.

ILLUSTRATIONS OF FUNGI—XXXIII

WILLIAM A. MURRILL

(WITH PLATES 2–9)

The last article of this series, devoted to *Boletus luteus, Tylopilus alboater,* and *Armillaria nardosmia,* appeared in *Mycologia* for March, 1920. To illustrate the species included in the present article, I shall use photographs made from the fresh specimens.

Chanterel floccosus Schw.

FLOCCOSE CHANTEREL

Plate 2. × ¼

Pileus elongated trumpet-shaped to funnel-shaped, closed at the top when very young, becoming deeply infundibuliform, firm, fleshy, gregarious to subcespitose, 5–14 cm. broad, 10–18 cm. high; surface floccose, with persistent or evanescent scales, bright-yellow when young, some shade of orange when mature, fading at times; margin concolorous, rarely tinged with lilac, undulate, involute when dry; context thin, white, sweet, edible; hymenium cremeous at first, then ochraceous, rarely pale-umber tinged with lilac, finally ochraceous-brown throughout; lamellae thick, close, narrow, decurrent, repeatedly forked, branching or anastomosing; spores ellipsoid, smooth, ochraceous, 14 x 7 μ; stipe short, glabrous or hairy, whitish at the base when young, becoming cremeous or ochraceous.

This species, which was originally described from the Pocono Mountains in Pennsylvania, is large, handsome, and edible. It is to be looked for in damp places in dense woods throughout most of the eastern United States, occurring from Maine to Alabama and west, even to Oregon and Washington. It can not be called common, although I have at times found it fairly abundant in favored spots. The illustration is taken from a handsome photograph made in October, 1921, at Mount Vernon, New York, by Mr. A. W. Dreyfoos, and donated by him to the Garden herbarium. It shows well the peculiar and characteristic appearance of the surface of the pileus in its younger stages.

V 14 1 JAN 22 UMI

Clitocybe phyllophila (Pers.) Quél.

LEAF-LOVING CLITOCYBE

Plate 3. × 1

Pileus fleshy, convex or plane, becoming depressed or umbilicate, obtuse, solitary or cespitose, 4–7 cm. broad; surface smooth, dry, white, silvery on the margin because of the silky veil; lamellae moderately broad, subdistant, adnate or slightly decurrent, white, becoming yellowish-ochraceous; spores ellipsoid, 6–8 x 3–5 μ; stipe equal, stuffed or hollow, tough, downy and incurved at the base, spongy within, white, sometimes eccentric, 5–7 cm. long, 5–8 mm. thick.

A well-known European species found in the eastern United States from New England to North Carolina and west to Wisconsin. As its name implies, it is fond of fallen leaves and sticks in woods. Peck does not list it as edible and I have not experimented with it, but when it has been tried out it will very probably be found among the edible species. The photograph was made from plants collected at Stockbridge, Massachusetts, October 3, 1911.

Clitocybe subhirta Peck

SLIGHTLY-HAIRY CLITOCYBE

Plate 4. × 1

Pileus convex or nearly plane, sometimes slightly depressed, 2.5–7 cm. broad; surface at first hairy-tomentose, then nearly glabrous, pale-yellow or buff, becoming whitish, margin incurved; lamellae crowded, adnate or decurrent, whitish or pale-yellow; spores subglobose, 4–5 μ; stipe nearly equal, stuffed or hollow, sometimes eccentric, 2.5–5 cm. long, 6–10 mm. thick.

A rare species, described from Brewerton, New York, and known only from this state and Massachusetts. Its edible qualities have not been tested. The photograph was made from plants collected at Stockbridge, Massachusetts, in October, 1911.

Melanoleuca Thompsoniana Murrill

THOMPSON'S MELANOLEUCA

Plate 5. × 1

Pileus large and attractive, convex to plane with a broad umbo,

sometimes splitting with age, gregarious, reaching 10 cm. broad; surface dry, glabrous, somewhat rimose, flavous over the whole surface when young, becoming dark-luteous at the center and flavous or cream-colored toward the margin; context thin, white or yellowish; lamellae adnate, becoming slightly sinuate and seceding, rather crowded and narrow, lemon-yellow when young, becoming flavo-luteous with age, brownish on drying; spores subglobose, smooth, hyaline, 5–7 μ; stipe long, equal, longitudinally striate, glabrous, lemon-yellow, fleshy, firm, 14 cm. long, 2–2.5 cm. thick.

An attractive yellow species described by Peck in 1873 from Bethlehem, New York, as *Agaricus flavescens*, but this name had already been assigned to a species of *Agaricus* by Wallroth forty years before. It has been found on and about old pine stumps in New York, Massachusetts, and North Carolina. So far as I know, it has not been tested for edibility. The photograph was made from plants collected by Dr. Thompson and myself at Stockbridge, Massachusetts, October 3, 1911.

Melanoleuca eduriformis Murrill

RATHER-TOUGH MELANOLEUCA

Plate 6. × ¾

Pileus rather thin, becoming expanded or slightly depressed, gregarious to subcespitose, reaching 10 cm. broad; surface smooth, glabrous, polished, hygrophanous when wet, not viscid, isabelline to fulvous, scarcely darker at the center; margin concolorous, somewhat lobed; context white, with fragrant odor and very pleasant, mealy to nutty flavor; lamellae sinuate, rather narrow, crowded, white, unchanging; spores ellipsoid, smooth, hyaline, 5–6 x 2–3 μ; stipe larger above or below, rather irregular, pale-yellowish, white at the apex, smooth, glabrous, hollow, 8 cm. long, 1.5–2 cm. thick.

Described and known only from specimens collected in moist leaf-mold in the New York Botanical Garden, August 29, 1911. The illustration is from these specimens, which were not tested for edibility.

Galerula Hypni (Batsch) Murrill

MOSS-LOVING GALERULA

Plate 7. × 1

Pileus thin, membranous, subconic or campanulate, obtuse or

papillate, 5–15 mm. broad; surface glabrous, hygrophanous, watery-cinnamon or subochraceous and striatulate when moist, becoming paler when dry, often fading to yellowish or buff; margin usually striate; lamellae thin, broad, distant, adnate, ventricose, white or whitish, becoming ochraceous-yellow, often whitish-floccose on the edges; spores ovoid, pointed, smooth, uniguttulate, 8–12 x 5–7 μ; cystidia flask-shaped, 40–45 μ long, 8–10 μ thick at the base; stipe slender, flexuous, hollow, smooth or slightly silky-fibrillose, downy or pruinose at the apex, with a white mycelioid tomentum at the base, whitish or pallid, varying to fuliginous, 2.5–5 cm. long, about 1 mm. thick; veil slight, evanescent.

A dainty little plant occurring commonly among mosses or grasses in shaded places throughout Europe and temperate North America and occasionally found on high mountains in tropical America. The specimens figured were collected in the New York Botanical Garden in August, 1911.

Gymnopilus flavidellus Murrill

YELLOWISH GYMNOPILUS

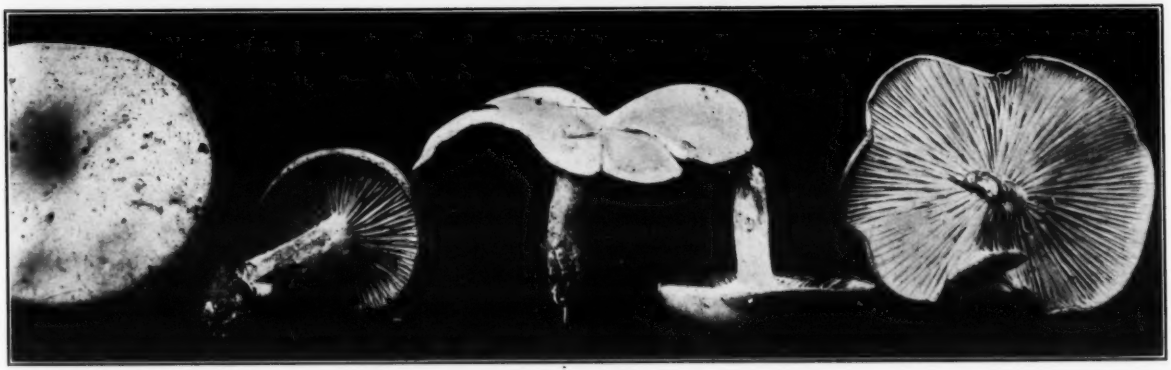
Plate 8. × 1

Pileus convex to plane or slightly depressed, gregarious or subcespitose, 3–5 cm. broad; surface dry or moist, smooth, glabrous, not striate, melleous to ochraceous or luteous at the center; margin entire, cream-colored; context yellowish, with mawkish, slightly bitter taste; lamellae adnate or sinuate with a decurrent tooth, rather crowded and narrow, pale-yellow to ferruginous; spores ovoid, minutely echinulate, ferruginous, 8–9 x 5–6 μ; stipe subequal, solid to hollow, pale-yellow to yellowish-brown, pruinose at the apex, whitish-mycelioid at the base, 3–5 cm. long, 3–5 mm. thick; veil arachnoid, fugacious.

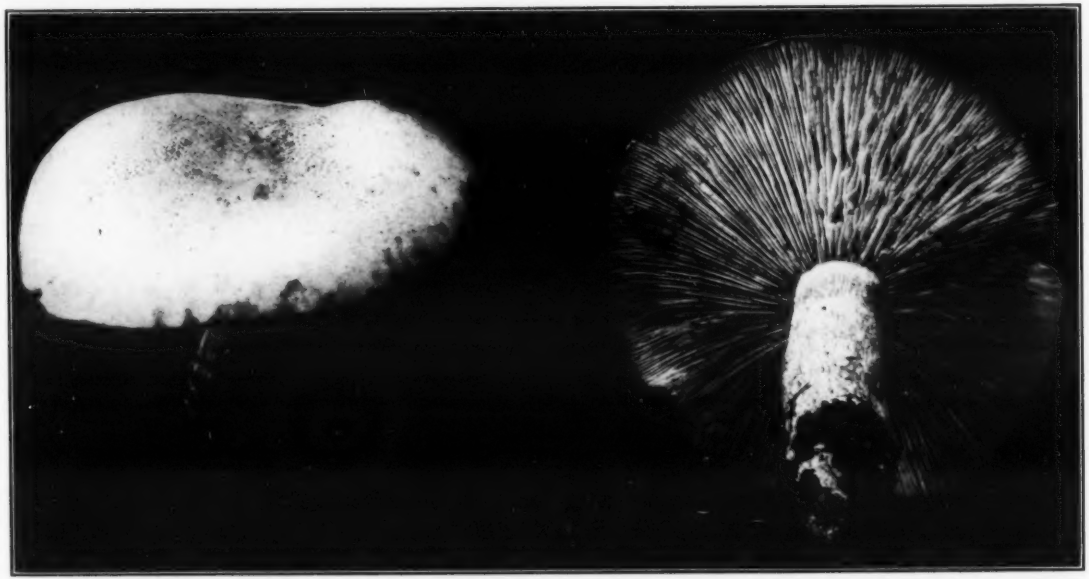
Described and figured from specimens collected on a chestnut stump in woods in the New York Botanical Garden, September 9, 1911. It occurs on dead wood of various deciduous and coniferous trees throughout most of temperate North America and has been found also in Bermuda. Species of this genus have not been sufficiently tested for edibility and should be avoided for the present. Some of them are known to be poisonous.

CHANTEREL FLOCCOSUS Schw.

V 14 1 JAN 2 UMI



CLITOCYBE PHYLLOPHILA (PERS.) QUÉL.



CLITOCYBE SUBHIRTA PECK

MELANOLEUCA THOMPSONIANA MURRILL

MELANOLEUCA EDURIFORMIS MURRILL

GALERULA HYPNI (BATSCH) MURRILL

GYMNOPILUS FLAVIDELLUS MURRILL

HEBELOMA LUTEUM MURRILL

Hebeloma luteum Murrill

EGG-YELLOW HEBELOMA

Plate 9. × 1

Pileus large, thick, fleshy, convex to plane, solitary, 5–10 cm. broad; surface smooth, glabrous, viscid, luteous; margin ochraceous, entire, not striate; lamellae sinuate, ventricose, crowded, melleous to ferruginous; spores ellipsoid, smooth, subfulvous in mass, melleous under the microscope, 7–8.5 x 4–5 μ; stipe equal or tapering upward, smooth, dry, glabrous, pearly-white, 5–7 cm. long, 7–15 mm. thick; veil fibrillose, slight, evanescent.

Described, figured, and known only from specimens collected on the ground in woods near Stockbridge, Massachusetts, early in September, 1911. This is another genus that is too difficult and too imperfectly known as yet to be recommended to amateur mycophagists.

NEW YORK BOTANICAL GARDEN.

V 14 1 JAN 2 UMI

THE OPHIOBOLUS CAUSING TAKE-ALL OF WHEAT

H. M. Fitzpatrick, H. E. Thomas, and R. S. Kirby

(With Plate 10 and 1 Text Figure)

The discovery of perithecia of a species of *Ophiobolus* in July, 1920, at East Rochester, New York, on wheat plants showing characteristic symptoms of the take-all disease was reported in an earlier paper.[1] Subsequently additional collections of the fungus have been made in scattered localities in New York, and reports of its occurrence in other states have been received. The fungus has also been obtained in pure culture, and repeated inoculations have demonstrated it to be the causal organism of the take-all disease. Normal perithecia with mature asci and spores have developed in culture, and a comparative study shows the organism used in the inoculations to be identical with that collected in the field. A paper dealing with the various aspects of the experimental work and embracing a discussion of the parasitism of the fungus has been submitted for publication.[2] In the present paper only facts bearing on the identity of the organism are considered.

In the historical and bibliographic discussion of the take-all disease prepared by Stevens[3] a number of papers are cited in which the discovery of perithecia of *Ophiobolus* in connection with diseased plants is reported. Two species, *O. graminis* Sacc. and *O. herpotrichus* (Fr.) Sacc., are mentioned repeatedly. It has seemed necessary to compare our fungus carefully with these and other species of *Ophiobolus* occurring on grasses, as well as with various

[1] Kirby, R. S., and Thomas, H. E. The take-all disease of wheat in New York. Science, N. S. **52**: 368–369. 1920.

[2] Kirby, R. S. The take-all disease of cereals and grasses. Phytopathology for January, 1922. (Abstract of paper presented at annual meeting of Phytopathological Society at Toronto, December 28, 1921. Complete paper not yet published.)

[3] Stevens, F. L. Foot-rot disease of wheat—historical and bibliographic. Bull. Nat. Hist. Survey. Illinois Dept. Registration and Education **13**: 259–286. 1919.

foreign collections of *Ophiobolus* associated with the take-all disease. Moreover, the economic importance of the disease has made desirable the publication of an illustrated description of the fungus for the use of those who are searching in various sections of the country for infected plants. This is particularly true since the published descriptions of grass-inhabiting species of *Ophiobolus* in most cases are brief and more or less inadequate.

Through the coöperation of several foreign correspondents the comparison of the American collections of the fungus with material from other countries has been accomplished. Specimens of *Ophiobolus* on wheat from three different localities in England were mailed for our examination by Doctor Cotton. Three collections on wheat and barley from various parts of Japan were submitted by Doctor Miyabe, one on barley from Italy was received from Professor Peglion and Mattirola, and a single collection from France was sent by Professor Foex. In all cases the fungus had been found associated with the typical symptoms of the take-all disease, and in every instance the material was labeled *O. graminis* Sacc. A critical examination of the various collections, including a comparative study of perithecia, asci, and spores, shows the fungus to be identical in every case with the American material. Furthermore, specimens collected in New York have been submitted to Professor McAlpine, and he writes: "I have carefully examined the specimens sent by you and on comparing the mycelium, perithecia, and spores have come to the conclusion that it is the same fungus as that occurring on Australian wheat." There can be no question, therefore, of the propriety of applying the name take-all to the disease of wheat in this country.

The fungus agrees in general with the descriptions of *O. graminis* given by Saccardo,[4, 5] and with the description and figures of this species published by Berlese.[6] There are certain minor points of difference, and for this reason the examination of the original collection is desirable. However, the herbarium of Saccardo has been practically unavailable since his death, the col-

[4] Saccardo, P. A. Fungi veneti novi vel critici. ser. II. Nuovo Giornale Botanico Italiano **7**: 307. 1875. (*Rhaphidophora graminis* Sacc.)

[5] Saccardo, P. A. Sylloge fungorum **2**: 349. 1883.

[6] Berlese, A. N. Icones Fungorum **2**: 119–120. Pl. 146, fig. 2. 1899.

lections having been kept in his home pending the action of the administrator of the estate. Through the kindness of Professor O. Mattirola it nevertheless has been possible to get in touch with the son, Professor D. Saccardo, and he has visited the herbarium and mailed us a fragment of material from a specimen labeled "*Ophiobolus graminis* exempl. Mad. Libert." This is probably the type collection, as the species was based on material in the herbarium of Libert.[7] Unfortunately, however, the material submitted is worthless, since it bears no perithecia of *Ophiobolus*. A second attempt to obtain material has been made, but has not yet proved successful. It is hoped that it will be possible to publish in a subsequent note information concerning the type specimen, but until the herbarium is made more readily available this may not be possible.

Berlese states that he examined the original collection of *O. graminis* in the herbarium of Saccardo, and that the figures of perithecia, asci, and spores given by him were drawn from it. His drawings of the perithecium indicate that the organism studied is identical with our own, and although the spores as figured by him are more slender than those of the take-all fungus, it is probable that they were drawn inaccurately, since they do not correspond with his description. In fact, his measurements of perithecia, asci, and spores agree so closely with those obtained by us for the take-all organism that its identity with *O. graminis* can hardly be questioned. His failure to mention paraphyses, and his statement that the spores are only tri-septate, are probably due to his having seen only a small amount of relatively unfavorable herbarium material. Since his description agrees with that of Saccardo, there seems to be no reasonable justification for questioning his statement that the figures were drawn from the type collection. He asserts further that he compared this material with the type collections of *Sphaeria eucrypta* Berk. & Br. and *S. cariceti* Berk. & Br. and found the three species to be identical. Moreover, he accepts the oldest specific name and designates the species as *O. eucryptus* (Berk. & Br.) Sacc.

[7] Roumeguere, C., et Saccardo, P. A. Reliquiae mycologicae Libertianae, series altera. Revue Mycologique **3**: No. 11. 39–59. Pl. 19, 20. 1881.

In the endeavor to corroborate Berlese's statements an attempt has been made to obtain from the herbarium of the Royal Botanic

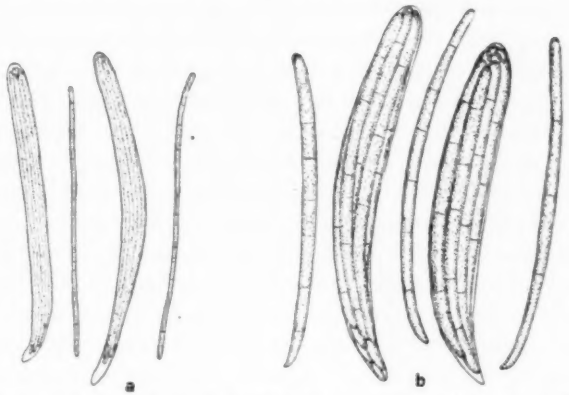


FIG. 1. *a*, Asci and spores of *Ophiobolus eucryptus*, from material collected by Broome on *Iris foetidissima*. × 625; *b*, Asci and spores of *O. cariceti*, from material collected in New York on wheat showing typical symptoms of the take-all disease. × 625. (Camera lucida)

Gardens at Kew portions of the original collections of these two British specimens. Since both species antedate *O. graminis*, the demonstration of the correctness of Berlese's assertion with reference to either would force us to discard the specific name *graminis*.

Miss Wakefield has very obligingly mailed to us from Kew material bearing on this nomenclatorial problem, and accompanying the material has written as follows:

"*Sphaeria eucrypta* B. & Br. There seems to be no type of this (on *Carex pendula*) in existence. We have 5 specimens collected by Broome, but all are on *Iris foetidissima*. I send you a slide of one of these—collected at Batheaston, Jan., 1859.

"*Sphaeria cariceti* B. & Br. The type of this in Berkeley's own herbarium (Batheaston, Dec., 1858) does not seem to have any mature perithecia left. I found some in another specimen from Cooke's herbarium collected by Broome. This is labelled in Broome's handwriting 'on *Aira caespitosa*, Batheaston, Jan., 1850,' but the name '*Sphaeria cariceti* B. & Br.' has been added at another time in rather different handwriting, which I doubt being that of

Broome. However, there are no specimens in Broome's herbarium at the British Museum,—so I am sending you a slide of this one, as it seems probably authentic."

In addition to the slides showing asci and spores, fragments of leaf sheaths showing perithecia were also sent to us, and a careful comparison of these specimens with material of the take-all organism was made.

The perithecia of *S. cariceti* as shown in the type specimen in Berkeley's herbarium have been examined and found to agree closely in size, shape, and other characters with those of our own organism. Their position on the host is also the same. Moreover, the asci and spores in the specimen from Cooke's herbarium are indistinguishable from those of the fungus of take-all. (Text Figure 1*b*.) There is, in fact, no point of evident difference between our organism and *S. cariceti* as seen on *Aira caespitosa* in these two specimens at Kew. Since asci and spores can not be obtained from the type specimen, it is not possible by a comparison of specimens alone to demonstrate that the material in the herbarium of Cooke is unquestionably *S. cariceti*. However, it agrees completely with the rather brief original description of the species given by Berkeley and Broome.[8] Fortunately, moreover, accompanying the description, drawings of an ascus and two spores are given which agree well in size and shape with the material in the herbarium of Cooke and with our own material of the take-all fungus. The spores as drawn are non-septate, but the arrangement of the guttulae indicates that at maturity a septation corresponding to that in the Cooke material would occur.

Since the perithecium of *S. cariceti* as seen in the type specimen is characteristic and agrees completely with that of the take-all organism, there would be on this basis alone considerable justification for regarding the two as the same. When as corroborative evidence the available data concerning the asci and spores are considered the identity of the two forms does not admit of a reasonable doubt.

The perithecia of the fungus from *Iris foetidissima* labeled *S. eucrypta* B. & Br. differ in several essential respects from those

[8] Berkeley, M. J., and Broome, C. E. Notices of British Fungi. Ann. and Mag. Nat. Hist. 7: ser. 3. 455. Pl. 17, fig. 35. 1861.

of *S. cariceti*. Instead of lying beneath the outer leaf sheath as in the latter species they occur within the tissue of the sheath itself. They possess much shorter beaks, lacking any pronounced tendency toward curvature, and protrude less evidently. The spores, although of about the same length, are considerably narrower and more flexuous. The asci are also correspondingly narrower. (Text Figure 1*a*.) In fact, the fungus differs strikingly from *S. cariceti* in several respects, the spores, though different, constituting the most evident point of resemblance. Since this material is not the type collection, and since it was found on another host plant, the possibility exists that it is not in reality *S. eucrypta*. It agrees, however, with the original description[9] of this species, except in the possession of somewhat longer spores, and is probably identical with it. In the original description the spores are said to be one five-hundredth of an inch (50 μ) in length. Saccardo states erroneously that they measure 125 μ. Since his description is based on that of Berkeley and Broome, this is merely an evident error in conversion of inches to microns, and has already been noted by Berlese, who gives the dimensions as 70–74 x 3 μ. Even if it were assumed that the type collection of *S. eucrypta* was in fact a different organism from that on *Iris foetidissima* there would be no justification for the assumption that it was identical with *S. cariceti*. The original descriptions of *S. eucrypta* and *S. cariceti* and the drawings which illustrate them are clearly based on two different species, and it is evident that Berlese was in error in regarding them as identical. Also it is evident that the name *Ophiobolus graminis*, widespread in the literature of the take-all disease, must be supplanted by the less familiar name, *O. cariceti* (B. & Br.) Sacc. If the examination of the type specimen of *O. graminis* shows it to be identical, as we believe, with *O. cariceti* the Saccardo name, being more recent, must be relegated to synonomy. If, on the other hand, it should prove to be specifically distinct, it will then have no significance in connection with the take-all disease.

Several other species of *Ophiobolus* have been described as occurring on the culms of grasses, but none of them resemble

[9] Berkeley, M. J., and Broome, C. E. Notices of British Fungi. Ann. and Mag. Nat. Hist. **9**: ser. 2. 383. Pl. 12, fig. 40. 1852.

closely the take-all organism. Since several authors have mentioned *O. herpotrichus* in connection with the disease, it, however, must be considered. The perithecia as pictured by Berlese resemble somewhat those of *O. cariceti,* but the asci and spores are very different. The spores are twice as long as those of the take-all organism, and are flexuous, thread-like, multiseptate, and brown. Confusion of the two species, therefore, is impossible.

Since the published diagnoses of *O. cariceti* are very brief and incomplete, the following description has been prepared. It is based on the specimens of *S. cariceti* received from Kew and on several collections of American and foreign material of the fungus found associated with the take-all disease. Consideration of the appearance of the fungus in pure culture is omitted.

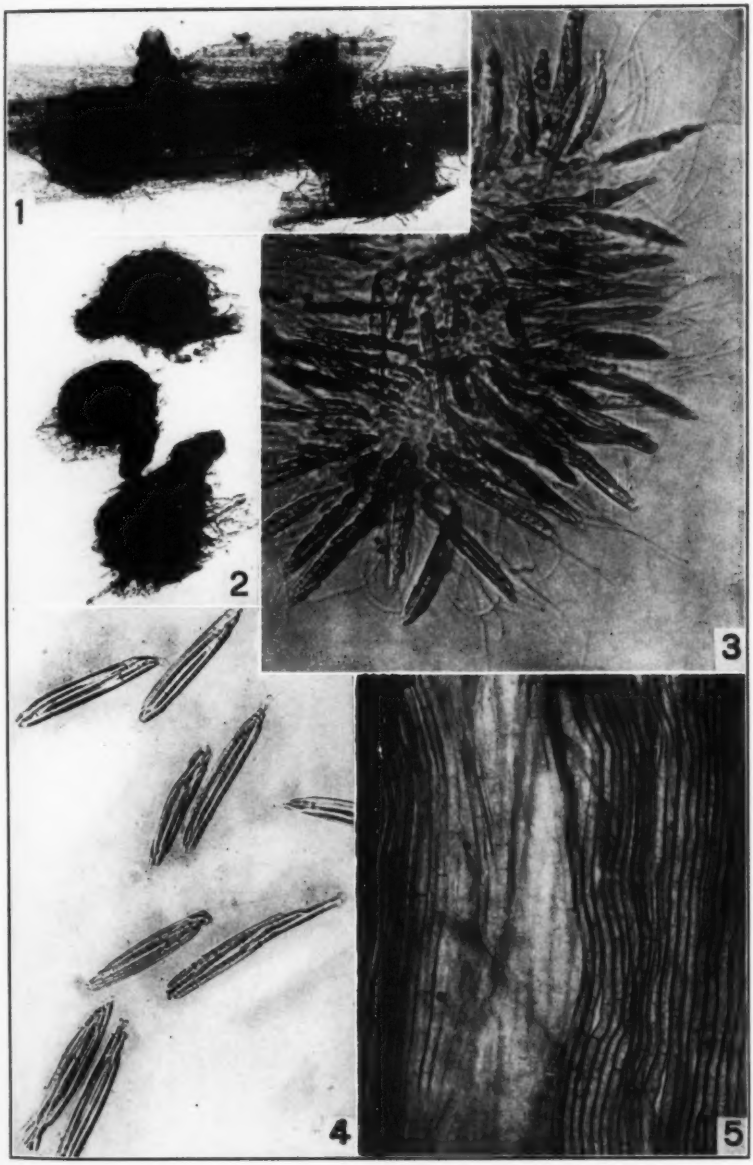
OPHIOBOLUS CARICETI (Berk. & Br.) Sacc., Sylloge Fungorum **2**: 349. 1883.

Sphaeria cariceti Berk. & Br., Ann. & Mag. Nat. Hist. **7**: ser. 3. 455. *pl. 17. fig. 35.* 1861.

? *Rhaphidophora graminis* Sacc., Nuovo. Giorn. Bot. Ital. **7**: 307. 1875.

? *Ophiobolus graminis* Sacc., Revue Mycol. **3**: No. 11. 45, 1881; and Syll. Fung. **2**: 349. 1883.

Mycelium permeating the roots of the host, causing them to become very brittle and easily broken away, developed profusely above the crown of the plant in and about the leaf sheaths, and forming a definite thick plate between the inner leaf sheath and the culm; the mycelial plate (Fig. 5) usually adhering to the culm when the leaf sheaths are stripped away, composed of coarse, dark brown hyphae, three to six microns in diameter, which frequently run rather definitely parallel to one another forming broad, flat, ribbon-like strands resembling somewhat compressed rhizomorphs; perithecia membranaceo-carbonaceous, dark brown to black, smooth, rostrate, ostiolate, occurring on the roots of the host especially within thick wefts of fine rootlets developed abnormally about the crown of the plant, but more frequently observed arising from the mycelium beneath the outer leaf sheath, standing singly or in groups, the individuals in a group occasionally fused laterally but no true stromatic tissue developed, firmly bound to the leaf sheaths by numerous strands of mycelium attached both to the neck and



OPHIOBOLUS CARICETI (BERK. & BR.) SACC.

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ascigerous portion, often developed in great numbers, more than one hundred individuals having been counted on a single culm, when young hidden from view but at maturity the beaks protruding and prominent, and by the shredding of the leaf sheath the upper hemisphere of the perithecium often exposed to view; perithecial beak developed obliquely and in the beginning lying more or less parallel to the surface of the culm, later, curving sharply outward, penetrating the leaf sheath and protruding, the obliquely attached curved beak so characteristic of the species as to be almost diagnostic (Fig. 1); ascigerous portion of the perithecium globose or subglobose, though sometimes compressed between the leaf sheaths, 330–500 μ (usually about 425 μ) in diameter, narrowing gradually into the truncate-conoid to cylindrical beak which frequently attains a length as great as the diameter of the ascigerous cavity (Fig. 2); asci (Fig. 4 and Text Fig. 1*b*) numerous, fascicled, elongate-clavate, straight or curved, short stipitate to subsessile, 90–115 x 10–13 μ, rounded at the apex, 8-spored, thin-walled; paraphyses (Fig. 3) abundant, thread-like, flexuous, unbranched, hyaline; ascospores fascicled to sub-biseriate, hyaline, as viewed together in the ascus faintly yellowish, linear, curved, broader at the middle and tapering gradually toward the ends, the upper end rounded, the basal end more acute and sometimes more sharply curved, 60–90 (chiefly 70–80) x 3 μ, when young continuous and multiguttulate, at maturity 5–7-septate, not reaching morphological maturity until late autumn or winter.

Parasitic on wheat, barley, rye, and various wild grasses, causing the take-all disease, apparently cosmopolitan in its distribution.

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EXPLANATION OF PLATE 10

Ophiobolus cariceti

All the figures were made from American material collected on wheat plants showing the typical symptoms of the take-all disease.

Fig. 1. Two perithecia developed below the outer leaf sheath. The oblique beaks illustrate one of the most characteristic features of the species. × 35.

Fig. 2. Three perithecia illustrating variation in shape. They are shown as they appear in a microscopic mount after removal from the plant, and no attempt was made to orient them in the erect position. × 35.

Fig. 3. A fascicle of asci and paraphyses. × 240.

Fig. 4. Asci. × 300.

Fig. 5. A portion of the mycelial plate formed about the culm. × 300.

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A PRELIMINARY LIST OF THE MYXOMYCETES OF THE CAYUGA LAKE BASIN

F. B. Wann and W. C. Muenscher

During the last five years the writers have made numerous collections of Myxomycetes in central New York, especially in the vicinity of Cornell University and Ithaca. These collections and many others which have been contributed by a number of collectors, as well as those available in the local herbaria, have been critically studied. In all, approximately 800 collections have been examined. The preliminary list given below is a record of all the species of Myxomycetes which the writers have seen and which are represented by material collected within the Cayuga Lake Basin.

The region covered by this list includes the territory drained by Cayuga Lake, the central lake of the Finger Lakes system of central New York. Roughly, the area includes a narrow strip averaging about eighteen miles in breadth, extending from Montezuma on the Erie Canal southward about sixty-five miles to Summit marsh in the northern part of Tioga County. The region includes the environs of Cornell University and the McLean Wild Life Preserve.

The list includes 92 species, in 30 genera and 11 families. Varieties are not recorded individually. Lister[1] gives 49 genera in 13 families for the world. The local representation of Myxomycetes would at first sight seem to be unusually large, but a more careful search will doubtless reveal many species in other localities with similar climatic conditions. The nomenclature used and the arrangement of species and genera under families adopted is essentially that used by Lister.[1]

The writers wish to acknowledge their indebtedness to the many persons who have contributed specimens to them from time to time; to Prof. H. H. Whetzel, who first suggested the work, for his constant interest and the many specimens contributed to us; to Prof. H. M. Fitzpatrick, for placing at our disposal for examina-

[1] Lister, A. A Monograph of the Mycetozoa. Ed. 2. 1911.

tion the Myxomycetes in the herbarium of the Department of Plant Pathology, New York State College of Agriculture, and also those in his private herbarium; to Prof. W. W. Rowlee, for giving us access to the collections in the herbarium of the Department of Botany of Cornell University; to Miss G. Lister, for verifying a number of doubtful specimens in the more difficult genera; and to Prof. T. H. Macbride, for his opinion regarding several collections.

The writers present this preliminary list, though incomplete, with the hope that it will stimulate interest in the discovery of other species which have not yet been seen from this locality.

MYXOMYCETES OF THE CAYUGA LAKE BASIN

SUBCLASS I.—EXOSPOREAE

Family 1. Ceratiomyxaceae

Ceratiomyxa fruticulosa (Muell.) Macbr.
Ceratiomyxa porioides (Alb. and Schw.) Schroet.

SUBCLASS II.—ENDOSPOREAE

Family 2. Physaraceae

Badhamia macrocarpa (Ces.) Rost.
Badhamia rubiginosa (Chev.) Rost.
Badhamia utricularis (Bull.) Berk.
Craterium leucocephalum (Pers.) Ditm.
Craterium aureum (Schum.) Rost.
Diachaea leucopoda (Bull.) Rost.
Diachaea splendens Peck
Diderma effusum (Schw.) Morgan
Diderma globosum Pers.
Diderma spumarioides Fries
Diderma testaceum (Schrad.) Pers.
Fuligo septica (L.) Gmelin
Leocarpus fragilis (Dickson) Rost.
Physarum cinereum (Batsch) Pers.
Physarum citrinellum Peck
Physarum citrinum Schum.
Physarum compactum (Wing.) Lister
Physarum contextum Pers.
Physarum flavicomum Berk.
Physarum galbeum Wing.
Physarum globuliferum (Bull.) Pers.
Physarum leucopus Link
Physarum melleum (Berk. and Br.) Massee

Physarum nucleatum Rex
Physarum nutans Pers.
Physarum polycephalum Schw.
Physarum pulcherrimum Berk. and Rav.
Physarum pulcripes Peck
Physarum rubiginosum Fries
Physarum sinuosum (Bull.) Weinm.
Physarum tenerum Rex
Physarum virescens Ditm.
Physarum viride (Bull.) Pers.

Family 3. Didymiaceae
Didymium clavus (Alb. and Schw.) Rost.
Didymium crustaceum Fries
Didymium difforme (Pers.) Duby
Didymium melanospermum (Pers.) Macbr.
Didymium squamulosum (Alb. and Schw.) Fries
Lepidoderma tigrinum (Schrad.) Rost.
Mucilago spongiosa (Leyss.) Morgan

Family 4. Stemonitaceae
Comatricha irregularis Rex
Comatricha longa Peck
Comatricha nigra (Pers.) Schroet.
Comatricha pulchella (Bab.) Rost.
Comatricha typhoides (Bull.) Rost.
Enerthenema papillatum (Pers.) Rost.
Lamproderma arcyrionema Rost.
Lamproderma columbinum (Pers.) Rost.
Lamproderma scintillans (Berk. and Br.) Morgan
Lamproderma violaceum (Fries) Rost.
Stemonitis ferruginea Ehrenb.
Stemonitis fusca Roth.
Stemonitis herbatica Peck
Stemonitis hyperopta Meylan
Stemonitis splendens Rost.

Family 5. Amaurochaetaceae
Brefeldia maxima (Fries) Rost.
Amaurochaete fuliginosa (Sow.) Macbr.

Family 6. Heterodermaceae
Cribraria argillacea Pers.
Cribraria aurantiaca Schrad.
Cribraria intricata Schrad.
Cribraria macrocarpa Schrad.
Cribraria purpurea Schrad.
Dictydium cancellatum (Batsch) Macbr.
Lindbladia effusa (Ehrenb.) Rost.

Family 7. Tubulinaceae
Tubifera ferruginosa (Batsch) Gmelin

Family 8. Reticulariaceae
- Dictydiaethalium plumbeum (Schum.) Rost.
- Enteridium Rozeanum (Rost.) Wing.
- Reticularia Lycoperdon Bull.

Family 9. Lycogalaceae
- Lycogala epidendrum (Buxb.) Fries
- Lycogala flavofuscum (Ehrenb.) Rost.

Family 10. Trichiaceae
- Hemitrichia clavata (Pers.) Rost.
- Hemitrichia serpula (Scop.) Rost.
- Hemitrichia vesparium (Batsch) Macbr.
- Oligonema flavidum (Peck) Massee
- Trichia Botrytis Pers.
- Trichia decipiens (Pers.) Macbr.
- Trichia favoginea (Batsch) Pers.
- Trichia persimilis Karst.
- Trichia scabra Rost.
- Trichia varia (Pers.) Rost.

Family 11. Arcyriaceae
- Arcyria cinerea (Bull.) Pers.
- Arcyria denudata (L.) Scheldon
- Arcyria ferruginea Sauter
- Arcyria globosa Schw.
- Arcyria incarnata Pers.
- Arcyria nutans (Bull.) Grev.
- Arcyria Oerstedtii Rost.
- Perichaena chrysosperma (Currey) Lister
- Perichaena corticalis (Batsch) Rost.
- Perichaena vermicularis (Schw.) Rost.

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NOTES AND BRIEF ARTICLES

[Unsigned notes are by the editor]

Dr. W. A. Murrill lectured on "Edible Wild Mushrooms" before the International Garden Club on the afternoon of Thursday, November 3.

Dr. L. O. Overholts, of the Pennsylvania State College, spent the latter half of December at the Garden, completing his study of *Pholiota*, an important genus of the fleshy fungi, for early publication in *North American Flora*.

Mrs. Alexander Taylor has presented to the Garden a number of colored drawings of fleshy fungi which she made in New Jersey, Massachusetts, and elsewhere. Dried specimens accompany the drawings.

Fungi detrimental to drugs—chiefly mildews, smuts, and rusts—are treated by Emil Herrmann in Pharm. Zentralh. **61**: 95–100. 1920.

Red or purple rice owes its color to a mold, *Monascus purpureus*. See an article on the manufacture of Chinese Ang Khak in the United States by Margaret Church in Jour. Indus. Eng. Chem. **12**: 45, 46. 1920.

A mosaic disease of Chinese cabbage, mustard, and turnip, which may be transmitted by aphids or by direct transfer of juice, was described and handsomely figured by E. S. Schultz in the *Journal of Agricultural Research* for October 15, 1921.

The stipitate polypores of Brazil have been described, figured, and keyed by C. Torrend in *Broteria* (Ser. Bot. **18**: 121–143. *pl. 5–8*. 1920). In the genus *Amauroderma* alone 34 species are

included, 3 of which—*A. Gusmanianum, A. picipes,* and *A. Mosselmanii*—are proposed as new.

Inonotus perplexus was found at Yama Farms, October 25, 1921, on a small dead trunk of *Populus grandidentata.* The cluster of overlapping pilei extended for ten inches or more up and down the trunk about a yard above the ground.

Professor F. S. Earle has returned to Porto Rico and is located at Central Aguirre, which is on the dry side of the island and not very good for fungi. He still finds a few specimens, however, which he shares with the Garden. Mrs. Earle is with him.

Professor A. F. Hutchinson, of the University of British Columbia, located at Vancouver, has sent for determination a box of woody fungi from his region. Among them is a handsome specimen of *Ganoderma oregonense,* collected on a dead stump of *Pseudotsuga taxifolia.*

Dr. H. H. Whetzel, who is this year acting as first agricultural assistant in the Department of Agriculture, Bermuda, has sent to the Garden herbarium his first collections of fungi from that region. Dr. Whetzel will have an unusual opportunity for working up the fungi of Bermuda.

The sclerotia-forming polypores of Australia are described and figured by Cleland and others in Trans. Proc. Roy. Soc. S. Austr. **43**: 11–22. *pl. 1–5.* 1919. True sclerotia are said to be caused by *Polyporus mylittae* and *P. minor-mylittae,* and false sclerotia by *P. tumulosus* and *P. basilapiloides.*

Several large and handsome photographs of fleshy fungi have recently been presented to the Garden by Mr. A. W. Dreyfoos, of Mount Vernon, New York, who has been interested in the fungi for several years. Among them are group pictures taken in the field of *Chanterel floccosus, Clitocybe illudens,* and *Lepiota procera.*

According to Barlot (Compt. Rend. **171**: 1014–1016. 1920), a 20–40 per cent aqueous solution of potash will distinguish *Mycena pura* from *Laccaria laccata,* the former giving a yellow and the latter a dark-brown color. *Gomphidius viscidus,* when similarly treated, gives a violet-brown color, while *G. glutinosus* yields a pale-yellowish brown.

Inonotus dryophilus was again fruiting on the white oak near the waterfall in the hemlock grove late in October, 1921. This time there were two clusters of hymenophores almost touching each other about two feet above the ground on the south side of the tree. These clusters were each about five inches broad and high, and projected about three inches from the trunk.

Canvas-destroying fungi were discussed by J. Ramsbottom in *Nature* (**105**: 563, 564. 1920), with various methods of inhibiting their development and growth. Species of *Macrosporium* and *Stemphylium* appeared to be the chief destructive agents, Soap, followed by alum and copper sulfate, gave good results at Malta; while sodium chromate proved superior in Saloniki.

Dr. Whetzel has sent in a number of fungi from Bermuda, among them *Laetiporus sulphureus, Lepiota cretacea, Auricularia nigrescens, Coriolus sericeohirsutus, Simblum sphaerocephalum, Polyporus Bracei, Hydrocybe ceracea,* and *Hydrocybe Earlei.* The last is a very beautiful species described and previously known only from Herradura, Cuba, where it grew in a pasture. According to Prof. Earle, the original collector, the colors become more brilliant after drying.

Coprinus micaceus was abundant in the horticultural grounds of the Garden on December 1. This was due to warm weather and late fall rains following a period of dry weather. About the middle of December several species of fleshy fungi were found growing in the woods at Blacksburg, Bedford, and other localities in Virginia. *Pleurotus ostreatus* and *Collybia velutipes* were abundant and rather to be expected, but species of *Cortinarius*—

like *C. semisanguineus*—and of *Russula*—like *R. emetica*—were also seen.

An unusually large cluster of the velvet-stemmed Collybia, *Gymnopus velutipes,* was observed November 20 on a decaying willow leaning over the Bronx River in North Meadows. This attractive edible species, which persists throughout the winter, was quite common during the autumn on various kinds of dead wood, but it seems to be partial to willow. The cluster in question measured six by eight inches and contained nearly a hundred distinct mushrooms—enough for a considerable meal. It has been suggested by Stewart that this species might easily be cultivated for food.

A large specimen of *Roskovites granulatus,* measuring over three inches in breadth, was found recently under white pine trees east of Conservatory Range 1. This rather common, edible species of *Boletus* grows naturally under pines and other evergreens and seems to be following *Boletus luteus* in its method of introduction into our grounds. The two species are much alike, but *B. luteus* has an ample white ring, is much more slimy, and the surface is usually darker. It will be remembered that this species, *B. luteus,* which is also edible, appeared several years ago under the pines near Conservatory Range 1 and has since spread about the base of individual trees, especially on the northern side, until basketfuls of it may be collected after the autumn rains.

While doing agricultural extension work in Franklin County, Washington, the writer found a fungus that was unknown to him. Upon returning to the State College the fungus was determined as a species of *Battarrea.* Further study has shown that the fungus coincides closely with *Battarrea laciniata* Underwood. This specimen was collected by the writer June 25, 1921, three miles west of Pasco, Franklin County, Washington. It was growing under a large sage brush, *Artemisia tridentata,* in pure silica sand near the banks of the Columbia River. For a description of this species, see Miss White's article on the "Tylostomaceae of North Amer-

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ica," published in Torrey Bulletin 8: 421–444. 1901.—*G. L. Zundel.*

In Dr. Robert T. Morris's handy and excellent little book on "Nut Growing," published last autumn by the Macmillan Company, the chief fungous parasites of nut trees are treated together on pp. 153–158, and later under each tree separately. *Melanconium oblongum,* according to Dr. Morris, is gradually killing our native butternut and is also attacking the imported Japanese walnut. The hazel blight, *Cryptosporella anomala,* makes little headway among our native hazels, which are accustomed to it, but violently attacks the Asiatic and European species when they are imported. The bacterial walnut blight and chestnut blight are also considered, together with methods of combating both the fungous and insect pests of nut trees.

In a note in *Mycologia* **13**: 58 the question was raised as to whether the cause of the difference between *Pucciniastrum* as it occurs on *Rubus triflorus* (*R. pubescens*) and on *R. idaeus aculeatissimus* (*R. strigosus*) lay in the parasites or in the hosts. In the summer of 1921, Mr. C. W. Bennett, working in the department of plant pathology of the University of Wisconsin, found that uredospores from *Rubus triflorus* did not infect *R. strigosus* or *R. occidentalis,* while those from *R. strigosus* infected that host abundantly and *R. occidentalis* sparingly, and on very young leaves only. As far as these few experiments go, they indicate that *Pucciniastrum arcticum* (Lagh.) Tranz. and *P. americanum* (Farl.) Arth. are distinct, and suggest that *Rubus strigosus* and *R. occidentalis* are not equivalent hosts of the latter.—*J. J. Davis.*

A FRAGRANT POLYPORE

Trametes suaveolens is a large white polypore frequent on decaying willow trunks in the northern hemisphere and easily dis-

tinguished, even at some distance, by its very agreeable, anise-like odor. In all my collecting, both in America and Europe, I never found this species on anything except willow until October 18, 1921, at Yama Farms, when I observed two large, fresh hymenophores about eight inches wide growing on a fallen dead trunk of the large-toothed aspen, *Populus grandidentata*, in the woods above the power-house west of Napanoch. The nearest willows were specimens of *Salix alba* in the Japanese garden of Yama Farms about a quarter of a mile away, and several hymenophores of *T. suaveolens* were conspicuous on their trunks. After this experience, I looked through our herbarium and found two other specimens collected on poplar, one by C. C. Hanmer (*2058*) at Hartford, Connecticut, many years ago, and the other by P. Wilson at Glenerie Falls, New York, August 31, 1914. The latter was at the base of living *Populus grandidentata* not very far from where I found my specimen. Mr. Hanmer did not mention the species of poplar on which his specimen grew. Poplars are near relatives of the willows, which accounts for their ability to serve as occasional hosts for this fungus.

W. A. MURRILL

SCHIZOPHYLLUM COMMUNE WITH A STIPE

Dr. C. E. Fairman's recent article, "The Fungi of Our Common Nuts and Pits,"[1] brings to mind the occurrence, some years back, of *Schizophyllum commune* on chestnuts imported from the Orient. The chestnuts had been placed in wet sand, in germinating trays, in the greenhouse of the United States Plant Introduction Field Station, at Chico, California. Buried to the depth of about two inches, they remained thus for a period long enough to induce germination, but, instead of young chestnut seedlings, a crop of the *Schizophyllum* appeared, much to the astonishment—and amusement—of the gardener, Mr. Henry Klopfer. On exhuming the nuts, it was found that nearly all had produced from their shells (not from their kernels) beautiful specimens of this common fungus, each specimen supported on a distinct stem that

[1] Proc. Rochester Acad. Sci. **6**: 73–115. *pl. 15–20.* Sept. 1921.

was just long enough to permit of the formation of the sporophore in the light.

As *Schizophyllum commune* (*S. alneum* of some authors) is normally astipitate, this case of adaptation to conditions is worthy of notice, and the name, form *stipitatum*, might be conveniently employed to designate such deviations from the type. The specimens were not kept, unfortunately.

While the writer was located at Chico he also noted that this species, in its normal state, is not infrequent on wounds in the bark of orange trees.

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LOUIS C. C. KRIEGER

HYGROPHORUS CAPRINUS

A fine cluster of this species was sent to me last October by Miss Eliza B. Blackford, who collected it in low, swampy places in coniferous woods at Ellis, Massachusetts, where she has noticed it for ten years or more during October and early November.

The original description by Scopoli (Fl. Carn., ed. 2. **2**: 438. 1772) is brief, but quite suggestive: "Pileus planiusculus. Lamellae amplae, continuae, simplices et ramosae. Stipes filamentosus. Habitat in subsylvestribus herbidisque locis. Pileus laevis; trium unciarum diametro, a Capris avide quaesitus. Stipes digiti humani crassitie, plenus, nudus, solitarius, basi tenuior." The specific name was selected because goats were so fond of it.

A more detailed description was published by Albertini and Schweinitz in 1805 (Consp. Fung., p. 177) under their *Agaricus camarophyllus fuligineus*. Their variety *atramentosus* is quite different from our plant, the pileus being atrocoeruleous in color.

Krombholz gives a fair representation of the American form under *Agaricus elixus* Sow. in his plate 72, figure 22, but the other two figures are different. *Hygrophorus fuligineus* Frost is dark-colored and the gills are white, but the entire hymenophore is heavily covered with slime.

Fries transferred this species to *Hygrophorus* in 1838 and Karsten placed it in *Camarophyllus* in 1879, using Scopoli's origi-

nal specific name in combination. The only other specimen I seem to have is one collected by Bresadola in fir woods near Trent in October, 1897. The following notes were made from the fresh specimens sent by Miss Blackford:

Dry when received but evidently slightly sticky when moist, virgate with delicate fibrils, uniformly avellaneous or slightly darker, top-shaped when young, slightly umbonate at times, cespitose, 6–7 cm. broad; context thick, pure-white, unchanging, taste sweet, nutty, odor becoming mealy in drying; lamellae short-decurrent, distant, very broad in front, tapering behind, mostly simple, white or slightly dirty-white, never yellowish, entire on the edges; stipe slightly tapering downward, subglabrous, white or slightly avellaneous, fistulose to stuffed, 6 cm. long, 1 cm. or more thick above; veil none.

W. A. MURRILL

AN ADDITION TO THE DISTRIBUTION OF A RARE FUNGUS

Early in the morning, October 23, 1921, I started with some of my first-year students on a walk to Hueston's Wood, five miles north of Oxford, Ohio. We reached the wood at daylight, and within a half hour Miss Grace Townsend, a keen-eyed freshman, spied something rising from the soil which brought forth a burst of enthusiasm. On reaching the spot, I decided at once that she had discovered something which had escaped notice hitherto, though I have botanized through this 200-acre stretch of beech wood with my students for fifteen years, on five different occasions remaining in camp for ten or twelve days and botanizing vigorously every day. The globose peridium, a centimeter and a half in diameter, expanded abruptly from the top of a somewhat slender stipe, which was five centimeters high and a half centimeter in diameter. The outer wall of the peridium was free from the stipe in a manner wholly unknown to me, while from the top of this peridium there arose a peculiar little chimney-like ostiole, which was a millimeter high and a little more than a millimeter in diameter. The peridium was a pale brownish, and the stipe was darker with a reddish cast. In short, the whole appearance was such as to excite the curiosity of an experienced mycologist, accustomed

to finding curious fungi. Diligent search netted us three specimens in all.

On reaching home, I consulted C. G. Lloyd's mycological notes, and soon discovered that the curious fungus belonged to the genus *Tylostoma* or *Tulostoma,* the first spelling preferable and the second perhaps the original. I sent one of the plants to Mr. Lloyd for specific determination, supposing that the three plants belonged to one of the common species of the genus. Mr. Lloyd's reply was as follows: "Your *Tylostoma* is *Tylostoma verrucosum* as named by Morgan. It is a very rare species, and I have collected it but once. It has a regular, tubular mouth, where it differs from *Tylostoma campestre.*"

Mr. Lloyd's monograph of the "TYLOSTOMEAE" appeared in 1906, at which time this rare species was known through but three collections, the original one by A. P. Morgan, near Preston, Ohio, the second by Mr. Lloyd himself, also in Ohio, and the third by W. H. Long, in Texas. There is nothing in Mr. Lloyd's letter to indicate that other collections have been made outside the original area, and ours seems to be the fourth locality from which this rare and interesting fungus has been collected.

Our three plants are very nearly of the same size, and the stipes are somewhat longer and the peridia somewhat smaller than Mr. Lloyd's Fig. 4, in plate 76 of his monograph.

BRUCE FINK

THE TORONTO MEETING

The thirteenth annual meeting of the American Phytopathological Society was held at Toronto, Canada, December 27–31, 1921. Prof. J. H. Faull, of the University of Toronto, had charge of the phytopathological exhibits. Section G of the A. A. A. S. and the Mycological Section of the Botanical Society of America assisted as usual with the program where the subjects and discussions were of mutual interest. Dr. Howe and Dr. Harper represented the New York Botanical Garden. Of the 2,000 present at the general meeting, about 200 were botanists. The next president of the Botanical Society of America is H. C. Cowles. The new

officers of the Phytopathological Society are: E. C. Stakman, president; N. J. Giddings, vice-president; Perley Spaulding, editor-in-chief, with L. L. Harter and G. M. Reed, assistants. The meeting next year will be held in Boston.

The most popular address was probably that by Prof. Bateson on "Evolutionary Faith and Modern Doubt." The symposium on the "Utility of the Species Concept" was important and well-timed. Dr. Millspaugh was unfortunately kept away by illness. Mosaic diseases occupied a prominent place at the meeting, about 20 papers being presented dealing with this subject. Dr. Duggar experimented with the mosaic disease of tobacco and found that the "virus" filters through porous cups as a liquid and therefore can not be a germ or similar organism. He termed it a "living fluid contagion." Experiments by Johnson, who has long worked on tobacco mosaic, led him to make the following statement: "It seems, therefore, that these results furnish evidence against the enzymatic theory of mosaic, while at the same time they favor parasitic hypothesis, since the temperature curve for the development of mosaic corresponds closely with that of the development of many of the plant pathogens."

Freda Detmers discussed the parasitic effect of *Poronidulus conchifer* on elm branches, claiming that it seems to be more injurious at times than suspected. L. M. Massey discussed "Fusarium-rot" of the Gladiolus. The corms become infected in the field and the rot advances in storage. The fungus seems to be *Fusarium oxysporum* Schecht. A poplar canker, caused by *Hypoxylon pruinatum,* was described by Povah. This disease is a trunk canker, which blackens the sapwood. It is very serious in certain sections. W. H. Snell spoke of the effect of heat upon the mycelium of certain structural timber-destroying fungi within wood, concluding that heating structures affected with decay to 47–48° C. by means of the heating systems, as has been suggested, would not kill the fungi even in moist cotton weave sheds, although the drying effect would be beneficial in certain types of structures. The application of these results to the effect of kiln drying upon structural timber decay was pointed out. R. J. Blair spoke of experiments with storing wood pulp in water to protect it from

fungi. An experiment was carried out using several kinds of commercial pulps in order to test the preservative value of water upon sheets of pulp immersed in it. After an interval of seventeen months the pulp was examined and tested for freeness. It was then made into small sheets of paper, which were tested for bursting strength and for tensile tear. The pulp stored in water came through the test in much better condition than that which was piled on a shed where it was given an opportunity to dry out.

W. A. MURRILL

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